

an alkyl or aromatic organic [a] spacer molecule bound to the binding group [surface]; and

a carbohydrate derivative, O-, N-, C-, or S-glycosidically bound to the spacer molecule, which carbohydrate derivative specifically binds in a sample to at least one member selected from the group consisting of a protein, a virus and a cell.

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23. (Amended) The biosensor according to claim ¹~~22~~, wherein said carbohydrate derivative is a [biologically active part] fragment of a naturally occurring carbohydrate sequence, which fragment binds in a biospecific manner to at least one member selected from the group consisting of a protein, a virus and a cell.

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24. (Amended) The biosensor according to claim ¹~~22~~, wherein said binding group [spacer] is chemically bound or is bound via adsorption to the surface of the biosensor.

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25. The biosensor according to claim ¹~~22~~, wherein said surface comprises a signal transducer.

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26. The biosensor according to claim ¹~~22~~, wherein said surface comprises a means for monitoring a physical signal.

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~~27~~. The biosensor according to claim ¹⁰~~26~~, wherein said means for monitoring a physical signal is at least one member selected from the group consisting of a photometer, a chemical electrode, an electrochemical electrode, a temperature signal transducer, and a pressure signal transducer.

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³ ~~28~~. (Amended) The biosensor according to claim ²~~23~~, wherein the fragment of a naturally occurring carbohydrate sequence [said biologically active carbohydrate derivative] is a member selected from the group consisting of a mono-, di-, tri-, tetra-, or penta-saccharide sequence.

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² ~~29~~. (Twice Amended) The biosensor according to claim ²~~23~~, wherein the fragment of a naturally occurring carbohydrate sequence [said biologically active carbohydrate derivative] selectively binds to at least one member selected from the group consisting of a lectin, an antibody against a carbohydrate, a cancer cell, a protein associated with a blood group determinant, a pathogenic bacteria, a pathogenic virus, a pathogenic toxin, a protein associated with an inflammatory reaction, and a cell associated with an inflammatory reaction.

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² ~~30~~. (Amended) The biosensor according to claim ²~~23~~, wherein the fragment of a naturally occurring carbohydrate sequence [said carbohydrate derivative] binds to P-fimbriated E. coli.

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~~31~~. The biosensor according to claim ¹~~22~~, wherein said carbohydrate derivative comprises at least one component selected from the group consisting of hexosamine-, fucose-, galactose-, glucose-, mannose-, xylose-, a N-acetylneuraminic acid residue, and analogs thereof.

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~~32~~. The biosensor according to claim ¹²~~31~~, wherein the carbohydrate derivative has been derivatized in at least one hydroxyl group or amino group thereof with an organic or inorganic group.

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~~33~~. The biosensor according to claim ¹~~22~~, in which the carbohydrate derivative contains at least one O-, N-, S-, or C-glycosidically bound aglycon.

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~~34~~. The biosensor according to claim ¹⁴~~33~~, in which the aglycon contains at least one aliphatic or aromatic compound.

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~~35~~. (Amended) The biosensor according to claim ¹⁴~~34~~, in which the aglycon part of the carbohydrate derivative contains an amino acid component [-], peptide component [-], or protein component.
¹ molecule

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~~36~~. (Amended) The biosensor according to claim ¹~~22~~, in which the carbohydrate derivative comprises at least one of a glycoprotein and [or] a neoglycoprotein.

~~18~~~~1~~

~~37.~~ The biosensor according to claim ~~22~~, wherein said surface is operably associated with an optical sensor which gives a signal change upon binding of a protein, a virus or a cell to the carbohydrate derivative bound via the spacer to the surface.

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~~38.~~ The biosensor according to claim ~~37~~, wherein the optical sensor functions by at least one method selected from the group consisting of surface plasmon changes, ellipsometry, reflection measurement and polarization measurement.

~~20~~~~1~~

~~39.~~ The biosensor according to claim ~~22~~, in which the surface is operably associated with a member selected from the group consisting of a piezoelectric crystal, an electrochemical electrode and a thermistor.

~~21~~~~1~~

~~40.~~ The biosensor according to claim ~~22~~, wherein said surface of the biosensor comprises gold.

~~22~~ ~~43.~~~~1~~

(Amended) A method of using the biosensor according to claim ~~22~~ to determine the presence or amount of a protein, a virus or a cell, comprising the steps of:

exposing the biosensor to a sample containing a protein, a virus or a cell to be measured,

binding a protein, virus or cell to the biosensor, and

measuring the presence or amount of the protein, virus or cell in the sample.

25 ~~27~~ 45. (Amended) The immobilized carbohydrate derivative biosensor according to claim ~~22~~ [44], further comprising a protein which is linked between the spacer molecule and the binding group [biosensor surface].

46. The biosensor according to claim 22, wherein said spacer comprises albumin.

47. The biosensor according to claim 22, wherein said spacer comprises a protein.

~~8~~ 48. The biosensor according to claim ~~25~~, wherein said signal transducer is a chemical transducer.

~~9~~ 49. The biosensor according to claim ~~25~~, wherein said signal transducer is a physical transducer.

Please add new claims 50-84, as follows:

44 ~~50~~. The immobilized carbohydrate derivative biosensor according to claim ~~22~~, further comprising a protein which is linked between the binding group and the biosensor surface.

25 ~~27~~ 51. The biosensor according to claim ~~48~~, wherein said carbohydrate derivative is a fragment of a naturally occurring carbohydrate sequence, which fragment binds in a biospecific manner to at least one member selected from the group consisting of a protein, a virus and a cell.

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~~52~~. The biosensor according to claim ~~50~~, wherein said carbohydrate derivative is a fragment of a naturally occurring carbohydrate sequence, which fragment binds in a biospecific manner to at least one member selected from the group consisting of a protein, a virus and a cell.

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~~53~~. The biosensor according to claim ~~48~~, wherein said surface comprises a signal transducer.

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~~54~~. The biosensor according to claim ~~50~~, wherein said surface comprises a signal transducer.

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~~55~~. The biosensor according to claim ~~45~~, wherein said surface comprises a means for monitoring a physical signal.

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~~56~~. The biosensor according to claim ~~50~~, wherein said surface comprises a means for monitoring a physical signal.

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~~57~~. The biosensor according to claim ~~55~~, wherein said means for monitoring a physical signal is at least one member selected from the group consisting of a photometer, a chemical electrode, an electrochemical electrode, a temperature signal transducer, and a pressure signal transducer.

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~~58.~~ The biosensor according to claim ~~56,~~ wherein said means for monitoring a physical signal is at least one member selected from the group consisting of a photometer, a chemical electrode, an electrochemical electrode, a temperature signal transducer, and a pressure signal transducer.

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~~59.~~ The biosensor according to claim ~~51,~~ wherein the fragment of a naturally occurring carbohydrate sequence is a member selected from the group consisting of a mono-, di-, tri-, tetra-, or penta-saccharide sequence.

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~~60.~~ The biosensor according to claim ~~52,~~ wherein the fragment of a naturally occurring carbohydrate sequence is a member selected from the group consisting of a mono-, di-, tri-, tetra-, or penta-saccharide sequence.

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~~61.~~ The biosensor according to claim ~~51,~~ wherein the fragment of a naturally occurring carbohydrate sequence selectively binds to at least one member selected from the group consisting of a lectin, a cancer cell, a protein associated with a blood group determinant, a pathogenic bacteria, a pathogenic virus, a pathogenic toxin, a protein associated with an inflammatory reaction, and a cell associated with an inflammatory reaction.

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~~62.~~ The biosensor according to claim ~~52,~~ wherein the fragment of a naturally occurring

carbohydrate sequence selectively binds to at least one member selected from the group consisting of a lectin, a cancer cell, a protein associated with a blood group determinant, a pathogenic bacteria, a pathogenic virus, a pathogenic toxin, a protein associated with an inflammatory reaction, and a cell associated with an inflammatory reaction.

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~~63~~. The biosensor according to claim ~~45~~, wherein said surface is operably associated with an optical sensor which gives a signal change upon binding of a protein, a virus or a cell to the carbohydrate derivative.

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~~64~~. The biosensor according to claim ~~56~~, wherein said surface is operably associated with an optical sensor which gives a signal change upon binding of a protein, a virus or a cell to the carbohydrate derivative.

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~~65~~. The biosensor according to claim ~~63~~, wherein the optical sensor functions by at least one method selected from the group consisting of surface plasmon changes, ellipsometry, reflection measurement and polarization measurement.

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~~66~~. The biosensor according to claim ~~64~~, wherein the optical sensor functions by at least one method selected from the group consisting of surface plasmon changes, ellipsometry, reflection measurement and polarization measurement.

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~~67~~. The biosensor according to claim ~~45~~, in which the surface is operably associated with a member selected from the group consisting of a piezoelectric crystal, an electrochemical electrode and a thermistor.

~~53~~ ⁴⁴
~~68~~. The biosensor according to claim ~~50~~, in which the surface is operably associated with a member selected from the group consisting of a piezoelectric crystal, an electrochemical electrode and a thermistor.

~~57~~ ²⁷
~~69~~. The biosensor according to claim ~~45~~, wherein said surface of the biosensor comprises gold.

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cont.
~~54~~ ⁴⁴
~~70~~. The biosensor according to claim ~~50~~, wherein said surface of the biosensor comprises gold.

~~38~~ ²⁷
~~71~~. A method of using the biosensor according to claim ~~45~~ to determine the presence or amount of a protein, a virus or a cell, comprising the steps of:

exposing the biosensor to a sample containing a protein, a virus or a cell to be measured,

binding a protein, virus or cell to the biosensor, and

measuring the presence or amount of the protein, virus or cell in the sample.

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~~72~~. A method of using the biosensor according to claim ~~50~~ to determine the presence or amount of a protein, a virus or a cell, comprising the steps of:

exposing the biosensor to a sample containing a protein, a virus or a cell to be measured,

binding a protein, virus or cell to the biosensor, and

measuring the presence or amount of the protein, virus or cell in the sample.

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~~73~~. The biosensor according to claim ~~22~~, wherein:

the spacer molecule comprises an alkyl chain of the type $(-CH_2)_n$, in which n is an integer from 2 to 8.

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~~74~~. The biosensor according to claim ~~43~~, wherein:

the spacer molecule comprises an alkyl chain of the type $(-CH_2)_n$, in which n is an integer from 2 to 8.

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~~75~~. The biosensor according to claim ~~50~~, wherein:

the spacer molecule comprises an alkyl chain of the type $(-CH_2)_n$, in which n is an integer from 2 to 8.

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~~76~~. The biosensor according to claim ~~27~~, wherein:

cl⁶
cont

the spacer molecule comprises an aromatic group-containing structure; and
the binding group comprises a member selected from the group consisting of -S-, -
NH-CO-, -CO-NH-, -NH-, and -N=N-.

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~~71~~. The biosensor according to claim ~~45~~²⁷, wherein:

the spacer molecule comprises an aromatic group-containing structure; and
the binding group comprises a member selected from the group consisting of -S-, -
NH-CO-, -CO-NH-, -NH-, and -N=N-.

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~~78~~. The biosensor according to claim ~~50~~⁴⁴, wherein:

the spacer molecule comprises an aromatic group-containing structure; and
the binding group comprises a member selected from the group consisting of -S-, -
NH-CO-, -CO-NH-, -NH-, and -N=N-.

²⁵
~~79~~. The biosensor according to claim ~~22~~¹, wherein a chemical group is present between the
surface and the binding group.

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~~80~~. The biosensor according to claim ~~79~~²⁵, wherein the chemical group is a -CO-CH₂CH₂-
S- group.